Survey evidence on the impact of lecture recording on equality, diversity and inclusion aims in higher education

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Abstract

Lecture recording is becoming an important topic in higher education. In this study, 295 (13.8% response rate) first year students in a large, Scottish, Russell-Group university were surveyed on their attitudes to and use of lecture recordings in 2018. Kruskal-Wallis tests were used to compare ranked responses between students in different categories relevant to monitoring equality and diversity, such as carer status (5% of respondents), learning adjustments (9% of respondents) and non-native English speakers (27% of respondents). Students most commonly watched a full lecture by themselves when studying with 60% watching a full lecture at least once a week. Non-native English speakers were more likely to watch specific parts of a lecture more frequently ($H(^2) = 8.52$, $P = 0.014$). Students with learning adjustments more often reported being unable to find a resource ($H(^3)=8.356$, $p = 0.039$). There was no effect of students' language, carer status or learning adjustment status on their self-reported likelihood to attend a lecture, likelihood to change note taking behaviour, or concentrate on a lecture if it was being recorded. Non-native English speakers were still more likely to worry about keeping up with a lecture, even when it was being recorded ($H(^2) = 10.492$, $p = 0.005$). In conclusion, lecture recording has different impacts on students from different backgrounds, and inclusive lecture recording education policies need to consider this impact.

Keywords: lecture recording; technology enhanced learning; blended learning; inclusive learning

Introduction

Lecture recording, the practice of capturing all or parts of a teaching activity, is not a novel technology, being utilised in some form since the late sixties (Zawacki-Richter and Naidu 2016). Advances in technology, particularly the ability to automatically store and retrieve large amounts of video data, have prompted a boom in the technology's provision in institutions across the higher education sector (Newton et al. 2014). This has also prompted sector-wide discussion regarding whether lecture recording may devalue the classroom experience (Anderson and McGreal 2012; Conole et al. 2008).

The implementation of lecture recordings has the potential to transform the learning space, and staff and students approach the concept differently (MacKay 2019a). Danneels (2004) defines a 'disruptive technology' as one which eventually supplants a traditional technology, but lecture recording is often described as a supplementary resource by Higher Education Institutions (HEIs). Therefore there is considerable interest in how students might use lecture recordings. For example, one area of particular concern for lecturers is that student attendance in lectures will be negatively affected by the implementation of lecture recording (Chang 2007; Kwiatkowski and Demirbilek 2016) as lecturers often profess beliefs that personal interaction and engagement with lectures at the point of delivery is an important part of the pedagogical experience. Reasons for student non-attendance at lectures is considered to be highly personalised, encompassing health concerns, personal preference, motivation, and external pressures such as part-time employment or carer status (Kottasz 2005) and there is considerable work suggesting that the provision of extra resources, such as lecture recordings, do not *alone* encourage students to stop attending lectures (Gysbers et al. 2011). Further, an attending student may not necessarily be considered an 'engaged' student. Some studies suggest students may spend up to 60% of their device-related time in 'off-task' activities (Ragan et al. 2014). Engagement in higher education is complex, with an emotional basis and highly individualised to the student (Pekrun and Linnenbrink-Garcia 2012). The interactions between student attendance and lecture recordings are not clear, and are likely influenced by social

factors and student demographics. There has been work attempting to characterise patterns of student use, e.g. Phillips et al. (2010) proposed five behavioural patterns based on review of how often and when approximately 500 students watched recordings. Conscientious students showed regular revision over time, Crammer students watched a large volume of recordings close to exam periods, Good-Intentioned students began watching large volumes of recordings and then decreased, Repentant students watched more recordings after class tests, and Bingers watched recordings in large batches. More recently Ebbert and Dutke (2019) performed cluster analyses on 1079 students in a German university and identified five behaviour patterns. Approximately 27% of students were 'frequent repeats' who watched recordings in their entirety multiple times; another 27% watched whole lectures repeatedly, but only selecting certain lectures; 10% of students watched parts of a recording repeatedly; 15% of students watched selected parts of a recording rarely, potentially to review only topics they were unsure of; and 16% of students showed increased absenteeism in class, watching the recordings instead, usually completely.

As we explore how students may be using lecture recordings, we can aim to provide support for what strategies are more successful. There is presently limited evidence-based guidance regarding supporting students to use lecture recordings, see Nordmann and Mcgeorge (2018). However, both staff and students are receptive to exploring how lecture recording can be used to support inclusivity and diversity (MacKay 2019a), particularly when recordings are viewed as a supplementary resource. The dialogue surrounding supporting students through additional learning resources often uses the terminology of inclusivity, diversity and equality in education, alongside widening participation. Widening participation in higher education is a priority in many countries, for example Scotland aims to have 20% of HE entrants from the 20% of most deprived backgrounds within the country by 2030 (Scottish Funding Council 2018). Widening participation is generally defined in HESA data as the participation of groups that are under-represented in HE, relative to the population as a whole (HESA n.d.). This is often characterised as low-income areas, but can include Black and Minority Ethnic groups, students with a range of gender and sexual identities, and students with disabilities.

Widening participation strategies have been considered the outcome of the neoliberalisation of higher education, resulting from a desire for a more educated workforce (Kettley 2007). There are multiple definitions of inclusive education they generally share that it is an approach to diverse education environments that 'supports teachers to respond to individual differences between learners, but avoids the marginalisation that can occur when some students are treated differently' (Florian 2014). In this paper, I will use the European Universities Association definitions of Diversity, Inclusivity and Equality (Claeys-Kulik and Jørgensen 2018): Diversity refers to the demographic and social composition of a group, encompassing factors such as sex, gender, age, sexual orientation, ethnicity and cultural associations, religions, health conditions, and socio-economic background. With this definition, Widening Participation agendas prompt HEIs to strive for diverse student populations. Inclusivity refers to the actions taken to ensure a diverse population are feel valued. Inclusive educational policies require the HEI to be aware of the differences and privileges within their student body. Equality can then be thought of as the end goal for Widening Participation agendas, as it acknowledges that the student body has different starting points, and that specific barriers are faced by some students that need to be overcome for those students to meaningfully engage.

Digital teaching resources can support widening participation policies in four main areas, per (Lane 2012). The availability of resources, the affordability of resources, the accessibility of resources and the acceptability of the resource use to the student. There is a prevalence of literature debating whether recordings are a supplement or a complement to traditional education, but very little exploring the mechanisms through which recordings might complement lectures. For example, one study found that women, older students, and students who lived away from campus were more likely to make use of recorded resources (O'Brien and Verma 2018). This may well not be surprising, given that transport inequality is a significant barrier to widening participation in HE (Kenyon 2011) and the unequal care burden on women (Balka et al. 2010; Chopra 2015). Another study (Leadbeater et al. 2013) found no observed difference in achievement across students who made

use of lecture recordings, but did find that those students who were non-native English speakers or had learning adjustments made far higher use of the learning recordings. While Ebbert and Dutke (2019) and Phillips et al. (2010) did not find consistent evidence of social differences between their groups, there is still work to be done exploring how social factors influence student use of recordings. In this study I explore factors relating to diversity and their influence on student recording use in a purposeful sampling of first year undergraduates at the University of Edinburgh, and use this evidence to provide suggestions for inclusive and equitable study guidance.

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Materials and Methods

Context

This project was part of a larger implementation of a lecture recording system at the institution, see MacKay (2019a) for full details. In this study I report quantitative analyses of the student survey which was thematically analysed and reported upon in the previous study. The overarching study occurred over a non-consecutive 14-day period of industrial action on the behalf of academics, and this survey was devised to allow for data collection while I was taking part in the industrial action.

Ethics approval

This study was approved by the School of Education Ethics Sub-Committee at the University of Edinburgh, reference number 1218, and also by the Central Student Surveys ethics committee (Reference 10042018).

Participants and Recruitment

To avoid contributing to survey fatigue within the institution (Porter et al. 2004), I decided to target specific audiences of students to capture a range of experiences. To do this, I first explored other sources of data, including the previous year's course evaluation questionnaires (CEQ) across the institution. Through examination of the CEQ free text responses, eight schools were selected as a sample of a range of user experiences, e.g. schools where students had praised lecture recording, schools where students had expressed frustration with lecture recording, and schools with neutral lecture recording responses. Schools were also selected to capture experiences across the three colleges, the Science & Engineering College, the Medicine & Veterinary Medicine College, the Arts, Humanities and Social Sciences College.

First year students were sampled to avoid conflating the results of the present lecture recording system with other systems schools may have used. The institution's Central Surveys team distributed a Jisc Online Surveys link to eligible students via student emails. The survey opened on the 2nd May 2018 and a reminder was circulated on the 14th May. The survey closed on the 1st June (duration: 29 days). It was sent to 2125 first year students across the eight schools. A total of 295 students responded (13.8% response rate) and all respondents answered all questions. There was no need to exclude any responses.

Survey Items

As we were interested in equality and diversity categories, respondents were asked to if they identified as having a learning adjustment schedule, had English as a first language, or considered themselves a carer. Students were also asked to give their gender identity and age. All demographic questions were optional and featured a 'prefer not to say' response. Respondents were asked questions about the frequency of accessing lectures and recordings as a 5-point scale (At least once a day, at least once a week, at least once a month, less than once a month, never). Students were also asked about their behaviour in recorded lectures in comparison to non-recorded lectures with a 5-point Likert-like scale with responses ranging from 'Much Less Likely' to 'Much More Likely'. There was also a free text response. The full survey is available as an appendix.

Data Analysis

Data was exported from Jisc Online Surveys and processed with R (Version 3.5.2, 'Eggshell Igloo', R Core Team 2019). Likert-like questions were analysed using the 'likert' package (Bryer and Speerschneider 2016) to explore differences in item responses by groups. Kruskal-Wallis tests were used to compare ranked data between groups of respondents, and these are interpreted through

the use of post-hoc testing (one and two-tailed multiple comparison tests to establish which group is different, and Jonckheere-Terpstra tests to establish whether a pattern exists across multiple groups). Due to the relatively small dataset in comparison to the number of tests run, these results have been interpreted conservatively. Participants with missing demographic data were removed from that particular test.

159 (53.9%) of respondents elected to leave a comment regarding lecture recording in the survey. As thematic analyses had already been performed on this dataset, a natural language processing approach was taken to provide comparable results across datasets as per MacKay (2019b). This analysis was undertaken using the 'tidytext' package (Silge and Robinson 2016). Two measures of interest were explored: the term frequency and term frequency-inverse document frequency (TF-IDF). The term frequency is a count of how often a word appears within a body of text and is a relatively blunt measure of the term's importance. The term can then be analysed through the use of a sentiment analysis, to explore what negative and positive words are being used within a body of text. The TF-IDF is a measure of how unique a term is within a body of text in comparison to another body of text. Using the tidytext approach, student comments can be assigned a different group (e.g. carer comments versus non carer comments) and the TF-IDFs between groups can be compared. If one group has particularly high TF-IDFs, that is an indication they may be using that word more frequently that we would expect, and it may be a topic of interest for that group.

Results

There was good response across the schools, from 12 students in School F (Science & Engineering) to 51 students each in Schools B (Medicine and Veterinary Medicine) and H (Science & Engineering). 69% of respondents identified as a woman, the majority (87%) did not state they had any learning adjustments, 73% were native English speakers, and 93% had no caring responsibilities (Table 1)

Table 1: *Demographics of respondents including school and Course Evaluation Questionnaire responses*

			n	%
School	**College**	**CEQ satisfaction with lecture recording resources**		
School A	Science & Engineering	Negative	48	16%
School B	Medicine & Veterinary Medicine	Negative	51	17%
School C	Arts, Humanities & Social Sciences	Negative	37	13%
School D	Science & Engineering	Mixed	30	10%
School E	Medicine & Veterinary Medicine	Mixed	31	11%
School F	Science & Engineering	Positive	12	4%
School G	Arts, Humanities & Social Sciences	Positive	35	12%
School H	Science & Engineering	Positive	51	17%
Gender				
As a Man			83	28%
As a Woman			204	69%
In Another Way			1	0%
Prefer Not To Say			6	2%
No response			1	0%
Learning Adjustments				
Learning Adjustments			26	9%
No Learning Adjustments			257	87%
Not Sure			11	4%
Prefer Not to Say			1	0%
Native Language				
Native English Speaker			215	73%
Non Native English Speaker			79	27%
Prefer Not To Say			1	0%
Caring Responsibilities				
Carer			15	5%
Not A Carer			273	93%
Not Sure			7	2%

Student Use of Recorded Lectures

Students considered that their most common use of recorded lectures was to watch the full lecture by themselves with 60% responding that they watched full lectures at least once a week or more frequently (Table 2). 49% watched the specific parts of a recorded lecture that often, and only 3% watched a recorded lecture with their classmates that frequently.

Table 2: *N (%) of respondents who have engaged with recorded lectures*

Lecture Habits	Frequency	n	Perc
Wanted to go back and watch but been unable	1. At least once a day	18	6%
	2. At least once a week	59	20%
	3. At least once a month	86	29%
	4. Less than once a month	102	35%
	5. Never	30	10%
Watched a full recorded lecture	1. At least once a day	39	13%
	2. At least once a week	139	47%
	3. At least once a month	74	25%
	4. Less than once a month	27	9%
	5. Never	14	5%
Watched a recorded lecture with classmates	1. At least once a day	1	0%
	2. At least once a week	9	3%
	3. At least once a month	31	11%
	4. Less than once a month	44	15%
	5. Never	210	71%
Watched specific parts of a lecture	1. At least once a day	33	11%
	2. At least once a week	113	38%
	3. At least once a month	79	27%
	4. Less than once a month	39	13%
	5. Never	31	11%

There was no difference in students' reported frequency of watching lectures, or being able to obtain lectures by their carer status, whether they were a native English speaker, whether they had learning adjustments, or gender. However, non-native English speakers were slightly more likely to watch specific parts of a lecture more frequently ($H(^2) = 8.52$, $P = 0.014$, Figure 1).

Students generally were able to find recorded materials when they wanted them, with 45% of students reporting that they experienced trouble finding recorded materials less than once a month.

However, 26% of students reported being unable to watch a recorded lecture weekly or more frequently. Students with learning adjustments were more likely to report being unable to watch a lecture back again at least once a week ($H(^3)=8.356$, $p = 0.039$, Figure 2), and this was significantly different from students with no learning adjustments in two-tailed post hoc testing. While this is a small effect observed it is worth highlighting for future research in this area.

Figure 1*: Student self-reports of lecture watching behaviour by native language (n = 294)*

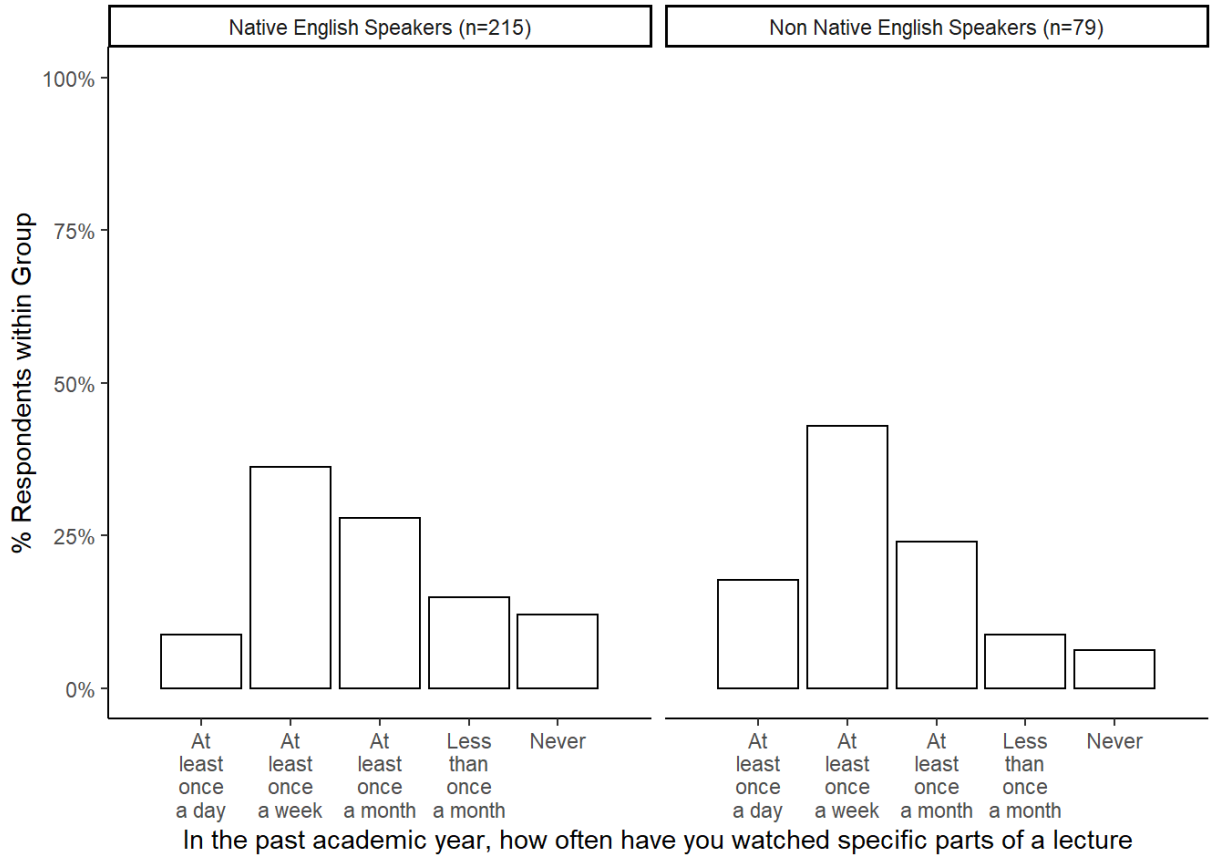
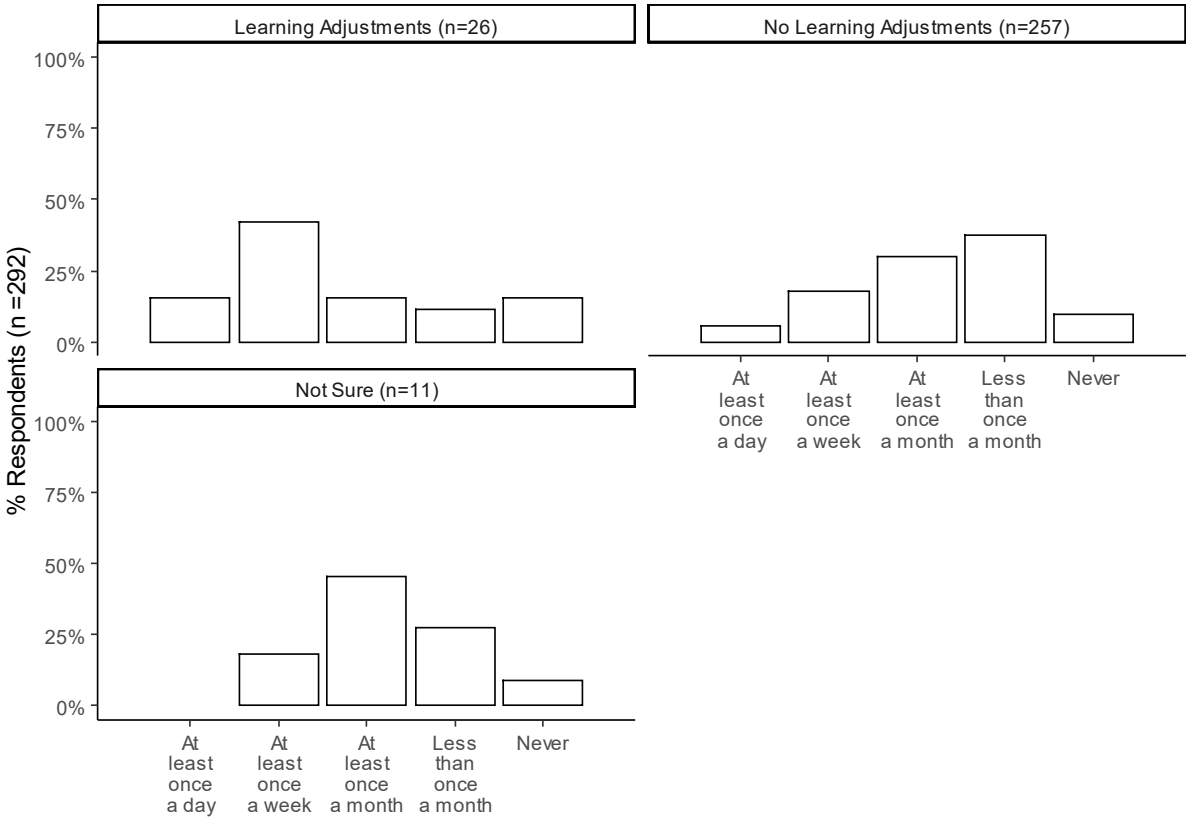


Figure 2: *Student self-reports of ability to find recordings when needed by learning adjustment (n = 292)*



Student behaviour

Students were asked how likely they were to perform certain behaviours if they were in a recorded lecture. Only 24% of students reported that they might be less likely to attend a lecture if they felt it was being recorded (Figure 3), and this was not affected by the School, whether or not the student had a learning adjustment, whether they were a native English speaker, their carer status, or gender. 69% of students thought there would be no difference in their concentration levels when lectures were recorded, and there was no difference across student status and school. Similarly, 67% of students felt there would be no difference in their likelihood to take notes during a recorded lecture, however there was a significant trend for students who identified as male to consider themselves less likely to take notes during recorded lectures. As this data was messy, a comparison was made strictly between students who identified as male (n = 83) and students who identified as female (n = 204) and this difference was no longer significant (Figure 4). 81% of students reported that there would be no difference in their likelihood to *answer* questions in a recorded lecture (Figure 3), with 10% even reporting they would be more likely to answer questions in a recorded lecture. Slightly fewer (77%) students reported there would be no difference in their likelihood to *ask* questions in a recorded lecture. There was some evidence that female students would be less likely to answer questions in recorded lectures, but this was again insignificant when compared strictly against male students (Figure 4). Although this difference did not remain significant it's worth noting that, in total, 24 students (8.1% of total) reported they would be less likely to answer questions in a recorded lecture, and of these 24, 79% identified as a woman. There was a suggestion that students with learning adjustments may also be less likely to *ask* a question in a recorded lecture, however this difference was small ($H(^{3}) = 10.47$, $p = 0.015$, Figure 5) and did not remain significant during post-hoc testing.

Figure 3: *Student self-reports of behaviour in recorded lectures*

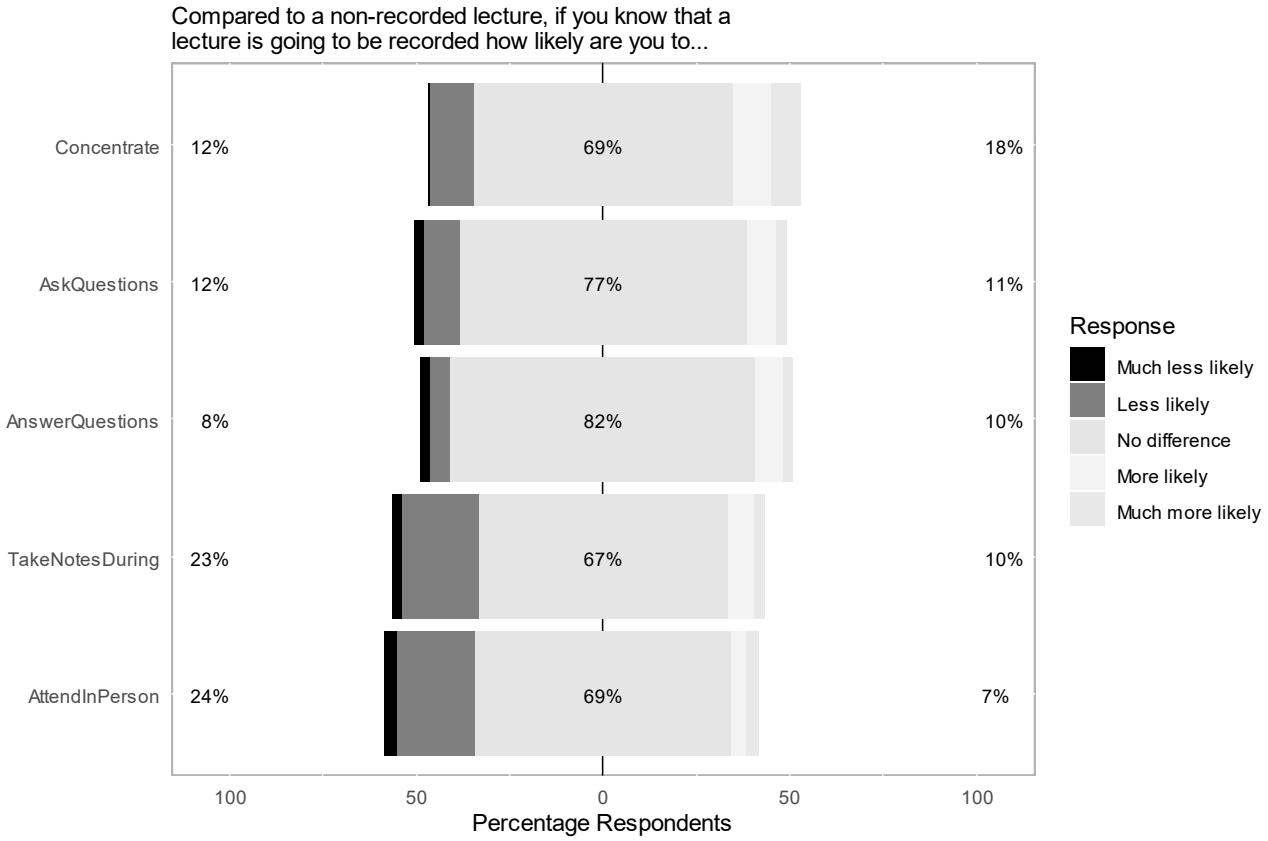


Figure 4: *Student self-reports of question-asking and note-taking behaviour during recorded lectures by gender*

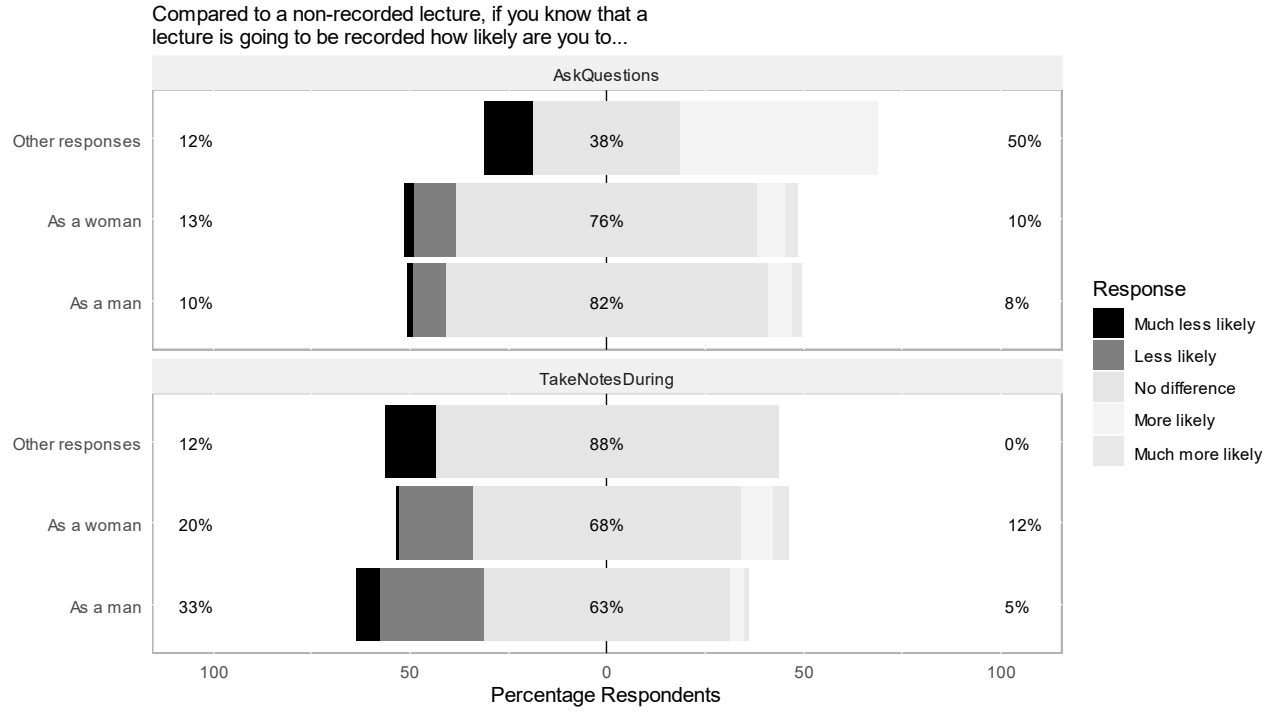
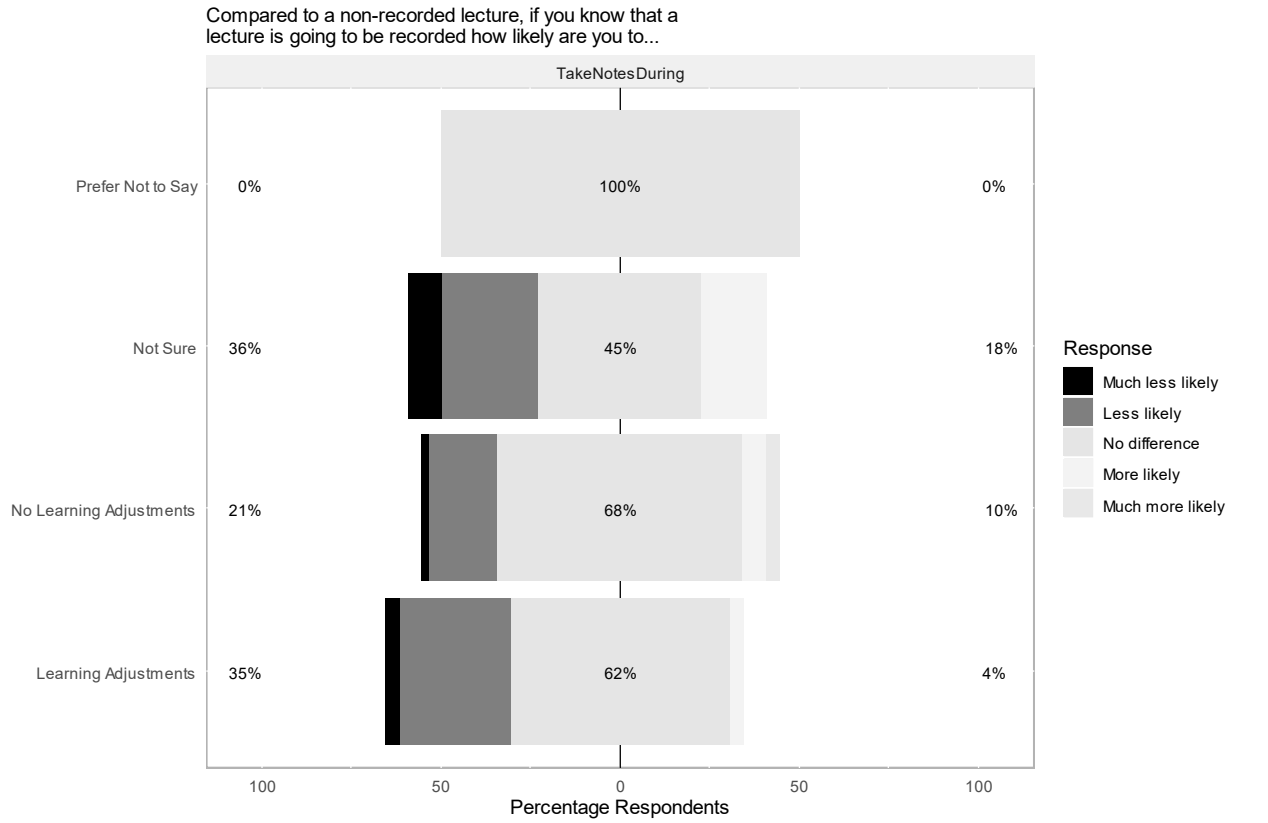


Figure 5: Student self-reports of note-taking behaviour by learning adjustment



How Do Recorded Lectures Affect Student Worry?

74% of students responded that they would be less likely to worry about keeping up with a lecture when it was recorded, while 87% of students felt there would be no difference in their concerns regarding their own privacy, and 73% felt there would be no difference regarding their worries about giving the wrong answer in class (Figure 6).

Worries about keeping up, giving the wrong answer, and privacy concerns were not affected by School or student status, however non-native English speakers were significantly more likely than native English speakers to worry about keeping up with lectures, even when the lectures were recorded ($H(^2) = 10.492$, $p = 0.005$, Figure 7) which remained significant in a post-hoc two-tailed test.

Figure 6: *Student self-reports of worry in recorded lectures*

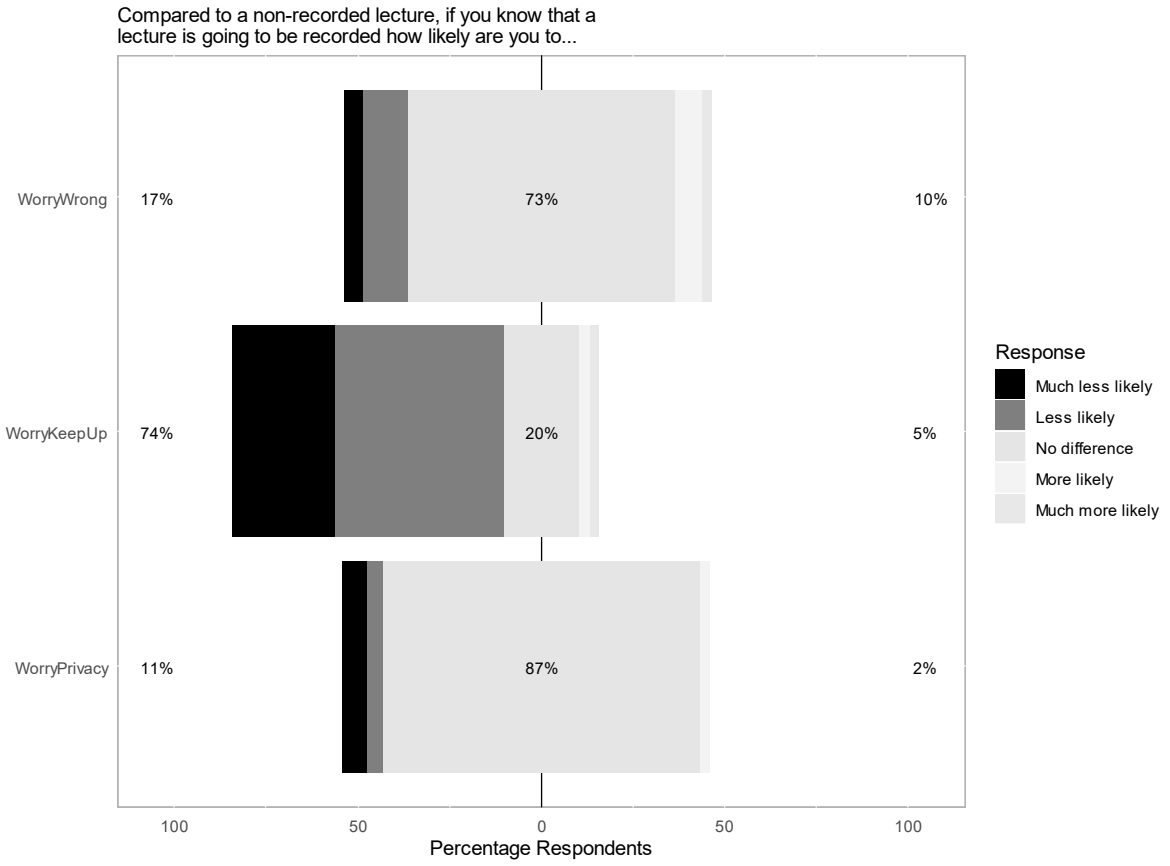
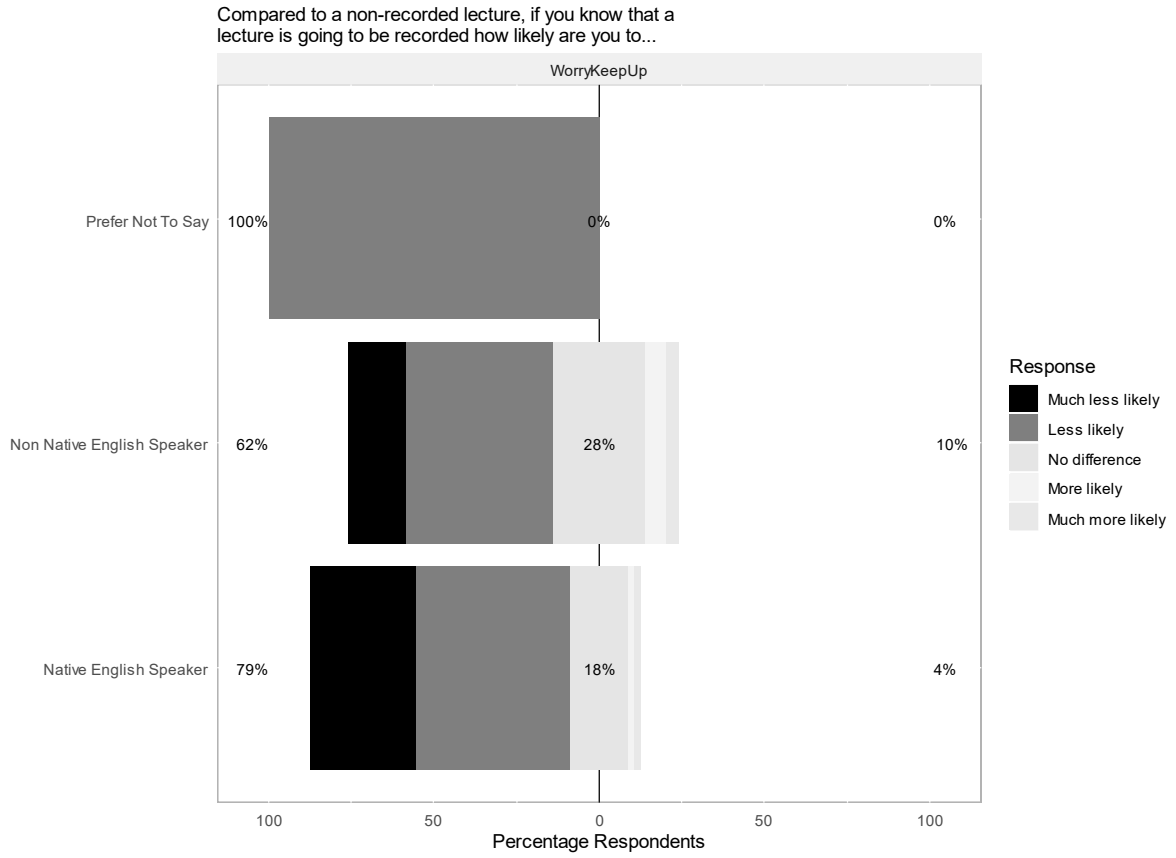
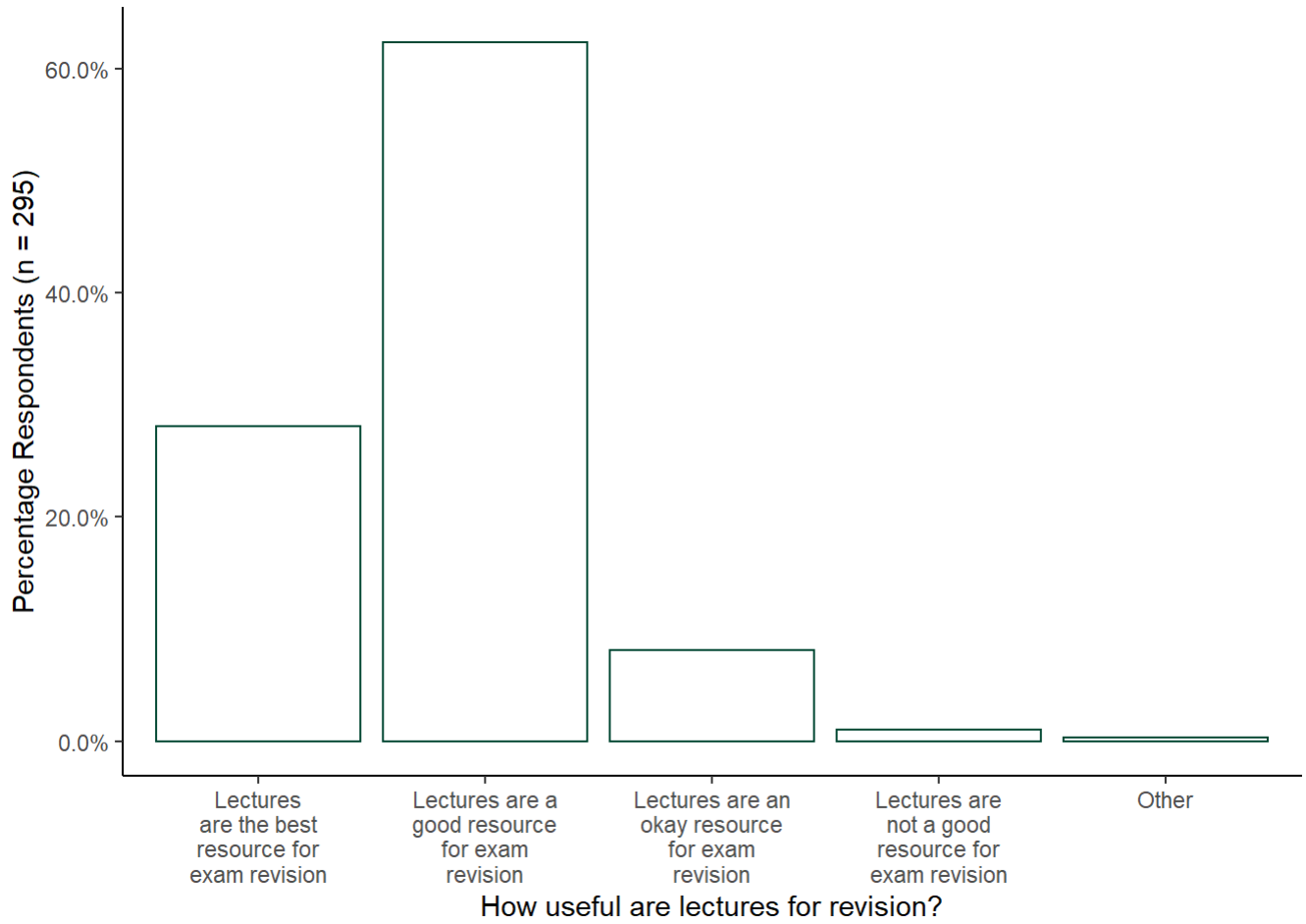


Figure 7: *Student self-reports of worrying about keeping up with materials in lectures by native language*



How do students study with recorded lectures?

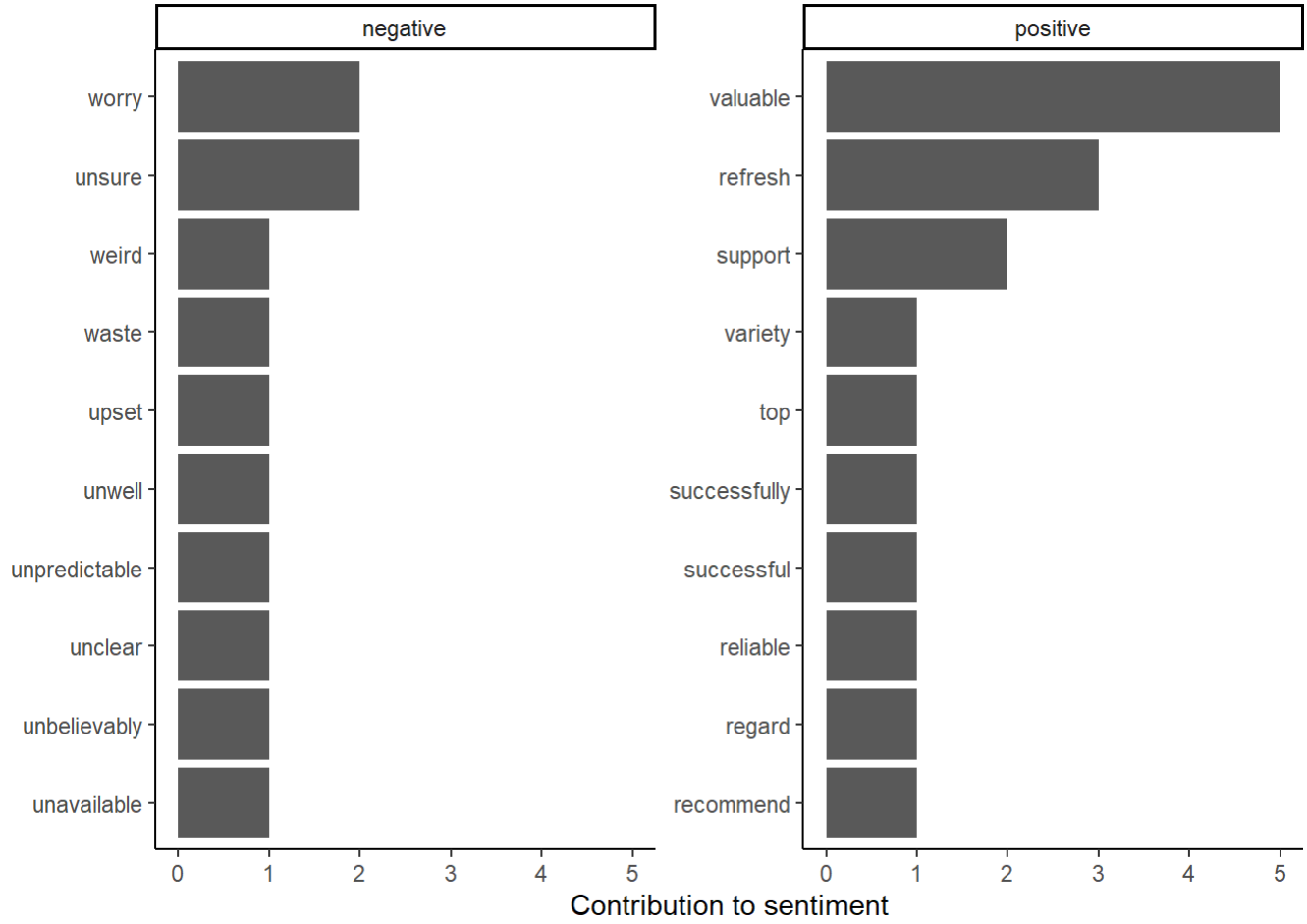
Students were asked how useful lectures were for exam revision and given a series of ranked options (not good, okay, good, best) and an 'other' category which had the option to provide more information. The majority of students (62%) considered lectures a good resource for exam revision (Figure 8), alongside reading other text and practicals. Perhaps of concern, 28% of respondents considered lectures were the best resource for exam revision as they 'gave all the information'. Only one student elected to provide 'other' information, and they considered lecture recordings extremely beneficial. There were no significant differences in a Chi^2 test in how students responded to this question if they were non-native English speakers, carers, or had learning adjustments.



Free Text Exploration

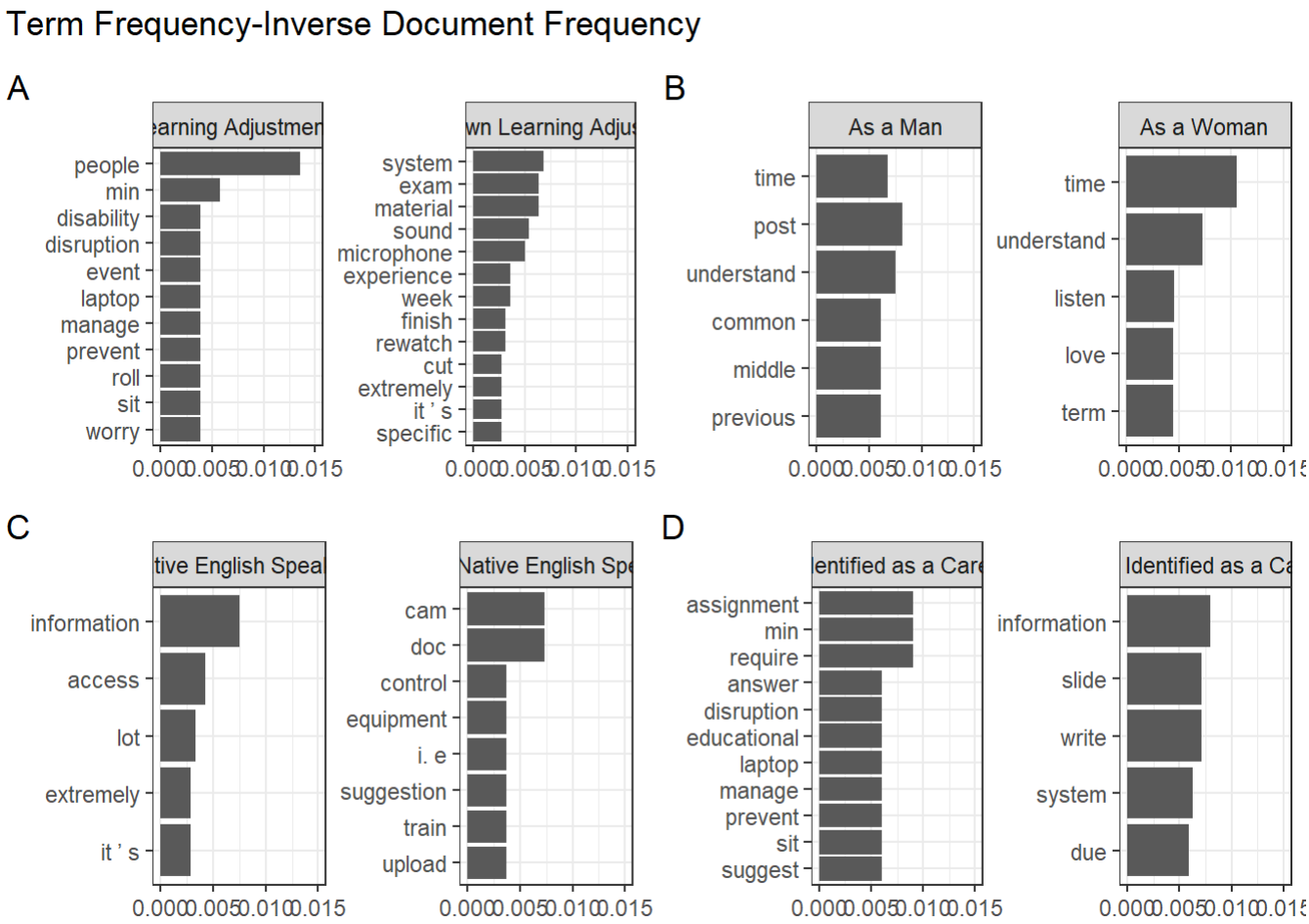
Across the 159 students who elected to leave a comment regarding lecture recording, a simplistic sentiment analysis suggests that negative feeling expressed in these comments is predominantly around 'worry' and being 'unsure', which is likely to be about how lecture recordings alleviate these feelings, given students did not report worrying more in lecture recordings above. Positive contributions to the sentiment come mainly from lectures being discussed as 'valuable', or as a 'support' (Figure 9).

Figure 9: *Words used in free text comments and their contribution to sentiments.*



Perhaps unsurprisingly, people with learning adjustments are more likely to use the word 'disability' (Figure 10), although there were no notable differences across gender, native language or carer status (Figure 10).

Figure 10: *Term Frequency-Inverse Document Frequency of words in free text comments for students with/without learning adjustments (A), students who identify as male/female (B), students who are native/non-native English speakers (C), and student who do/do not identify as Carers (D).*



Discussion

Supporting and promoting equality, diversity and inclusion in higher education is a powerful motivator for adopting lecture recording (MacKay 2019a). This may not be surprising as student 'stories' are an effective method of promoting support for students with dyslexia in workplace placements (Tee and Cowen 2012). However, it is often challenging in education to identify what social norms, epistemological assumptions, and barriers may exist for students in education systems (Aikman and Dyer 2012), especially as most senior academics in decision-making roles are more likely to come from privileged backgrounds (Aldercotte et al. 2017). In this work, I wanted to utilise an existing survey dataset to characterise how lecture recording may differentially affect students with different widening participation characteristics. The relatively small number of participants in

relation to the number of statistical tests run requires caution in the interpretation of these results. Additionally, the institution of study is not necessarily representative of the student body in other institutions, but these findings can be used to provide education policy makers with an insight into how lecture recording policies may affect widening participation strategies.

Key findings and implications

Students who were non-native English speakers were more likely to rewatch specific parts of a recorded lecture compared to native English speakers, and even when lectures were recorded, were still more likely to worry about keeping up with materials. Both Ebbert and Dutke (2019) and Phillips et al. (2010) identified study patterns which showed repeated rewatching of specific lecture parts, and both considered this a positive pattern. However, without knowing why a student is revisiting material frequently, we should be more cautious in this characterisation. If the student is revisiting a section to cope with a challenging accent or technical terminology (as seen in Chinnery et al. 2018) then we may be reassured. On the other hand, this time investment for non-native English speakers may be a source of added pressure which, prior to the introduction of lecture recording, was not present. Implementation of lecture recording should be sensitive of the reasons why these patterns of behaviour manifest, and ensure that students are guided as to how to make use of new resources.

A concerning finding was that students with learning adjustments reported being less able to find materials, and possibly less likely to ask questions during lecture recordings. In this study, learning adjustments were self-reported and undefined, so we do not know what adjustments students had. We know, however, that students with dyslexia can struggle to make complete notes (Olofsson et al. 2012), and so they may be more likely to seek out additional note-making resources in their revision. When a lecture is not recorded for pedagogical reasons, they may 'feel' the absence of the recording more than students without learning adjustments. Alternatively, these students may feel they cannot make use of the recordings or materials through the expressive and instrumental order of the school (Donnelly 2018).

Finally, while we observed no statistically significant differences in patterns of use from carers and between genders, there are some interesting observations in these data. There were some individuals in this survey who were less comfortable asking questions in recorded lectures, although they did not leave any free text data to explore the reasons why, it is vitally important that lecturers and educators are aware of these issues and build respectful discourse into their learning communities. It is important that we continue to use qualitative research to explore the 'deeper' experiences of students as they utilise these resources.

Inclusive learning with lecture recording

With these concerns, it may be tempting to disavow lecture recording, however I believe this would do a disservice to students given how positively it is viewed by students in this survey and in others (Leadbeater et al. 2013; Nordmann et al. 2018; Owston et al. 2011). It is, however, a tool which educators must provide students with guidance on how to effectively use (Nordmann and Mcgeorge 2018). More importantly, this guidance requires an understanding of how education is accessed by individuals and groups. Online video media, such as MOOCs, is now an accepted method of providing continuing professional development (Murray 2019), and universities should be preparing their students with how to learn in this environment to prepare their graduates for the world. As universities strive to create authentic learning environments we should seek to provide opportunities to learn in the context people will learn in after their graduation (Herrington and Herrington 2006).

In the implementation of lecture recording in tertiary education, educators must consider the teaching environment. An inclusive learning environment, per Claeys-Kulik and Jørgensen's (2018) definition of inclusivity is one which recognises the different barriers and experiences of the individuals in the room. There can be no "one size fits all" application of inclusive lecture recording because the impact of provision (and the impact of a lack of provision) is felt differently. Lecture

366 recording is often spoken of as ‘mainstreaming accessibility’ (Chinnery et al. 2018; Ellis 2011), and
367 this reinforces the idea that recordings are a supplementary resource for students (Nordmann and
368 Mcgeorge 2018) that students should be explicitly guided how to use. We cannot expect students to
369 study with, or use lecture recordings in a way that we do not ourselves explicitly model and teach. If
370 the importance of lectures is that practitioners can model practice. Pye et al. (2015) examined how
371 diverse student groups engaged with blended learning, and highlighted that blended learning
372 designs need to be framed for students in a way that makes staff expectation of students clear.
373 Students cannot ‘intuit’ how they are supposed to learn without clear frameworks about what their
374 discipline expects of them (Boud and Molloy 2013; Lea and Street 2006). An introduction of learning
375 recording therefore needs to clearly detail how students are expected to make use of the resource.

376

377 Conclusions

378 There are important differences in how students from different groups perceive the use of lecture
379 recordings, particularly around their access to recordings, and how they report using recordings in
380 their studies. When implementing lecture recording programmes, institutions should consider how
381 they can create inclusive guidance to support all students to make the best use of learning
382 environments.

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